THEREFORE WHAT IS CLAIMED IS:

1. A robotic mechanism, comprising:

a support base, an end effector and a biasing member having opposed ends and attached at one of said opposed ends to the support base and attached at the other of said opposed ends to the end effector; and

at least three cables each connected at a first end thereof to said end effector and said at least three cables having second ends being attached to an associated positioning mechanism for retracting or deploying each of said at least three cables to position said end effector in a selected position in space, said biasing member applying force on the end effector with respect to the support base for maintaining tension in said at least three cables.

2. The robotic mechanism according to claim 1 wherein said at least three cables is three pairs of cables, wherein said positioning mechanism includes three winches with a winch associated with each pair of cables for independently retracting or deploying each of said three pairs of cables, each winch being attached to said support base, each winch including a pulley with said second ends of said three pairs of cables being wrapped around a pulley in the associated winch, each winch including a motor connected to said pulley for rotating said pulley for winding and unwinding the pair of cables attached thereto, each pair of cables having the first ends of the two cables attached to the end-effector and the second ends of the two cables being attached to its associated winch in such a way that two cables of each pair of cables are parallel to each other and define a parallelogram so that during movement of the end effector the orientation of the end effector remains fixed so that the robotic mechanism has three degrees of freedom.

3. The robotic mechanism according to claim 1 including a computer controller connected to said positioning mechanism for synchronizing the movement of

each motor with respect to the other motors to control movement of said end-effector.

4. The robotic mechanism according to claim 1 wherein said positioning mechanism includes three rigid link arms each having first and second ends with the first end of each rigid link arm being pivotally attached to said support base, and wherein said at least three cables is three pairs of cables with the first ends of each pair of cables attached to the end-effector and the second ends of each pair of cables being attached to the second ends of an associated rigid link arm, and wherein said positioning mechanism includes actuator attached to said first end of each rigid link arm for pivotally moving said first end of each rigid support arm for moving said second end of each rigid link arm for pulling said cables, each pair of cables having the first ends of the two cables attached to the end-effector and the second ends of the two cables being attached to its associated rigid link arm so that the two cables of each pair of cables are parallel to each other and define a parallelogram so that during movement of the end effector the orientation of the end effector remains fixed so that the robotic mechanism has three degrees of freedom.

5. The robotic mechanism according to claim 4 wherein said first end of each rigid link arm is pivotally attached to said support base using a revolute joint.

6. The robotic mechanism according to claim 1 wherein said at least three cables is three pairs of cables with the first ends of each pair of cables attached to the end-effector and the second ends of each pair of cables being attached to an associated positioning mechanism including an actuator for moving the second ends of the associated pair of cables independently of the other pairs of cables, each pair of cables having the first ends of the two cables attached to the end-effector and the second ends of the two cables being attached to its associated actuator in such a way that two cables of each pair of cables are parallel to each other and define a parallelogram so that the robotic mechanism

has three degrees of freedom so that during movement of the end effector the orientation of the end effector remains fixed so that the robotic mechanism has three degrees of freedom.

7. The robotic mechanism according to claim 4 including a computer controller connected to each positioning mechanism for synchronizing the movement of each actuator with respect to the other actuators to control movement of said end-effector.

8. The robotic mechanism according to claim 1 wherein said biasing member is a spring.

9. The robotic mechanism according to claim 1 wherein said biasing member is one of a hydraulically, pneumatically, and electrically powered cylinder having an adjustable length.

10. The robotic mechanism according to claim 1 wherein said biasing member is pivotally attached to said end-effector and said support base using universal joints.

11. A robotic mechanism, comprising:

a support base, an end effector and a biasing member having opposed ends and pivotally attached at one of said opposed ends to the support base and pivotally attached at the other of said opposed ends to the end effector; and

six cables each connected at a first end thereof to said end effector and said six cables having second ends being attached to an associated positioning mechanism for moving the second ends of the associated cable independently of the other cables, said biasing member applying force on the end effector with respect to the support base for maintaining tension in said six cables, wherein movement of the second ends of the cables by the associated positioning

mechanisms changes a position and orientation of the end effector so that the robotic mechanism has six degrees of freedom.

12. The robotic mechanism according to claim 11 wherein said positioning mechanism includes six rigid link arms each having first and second ends with the first end of each rigid link arm being pivotally attached to said support base and the second end attached to the second end of an associated cable, said positioning mechanism including an actuator engaged to said each rigid link arm for pivotally moving said rigid link arm for moving said cables to position the end-effector in a work-space.

13. The robotic mechanism according to claim 11 wherein said biasing member is pivotally attached to said end effector and said support base with spherical joints.

14. The robotic mechanism according to claim 11 wherein said biasing member is pivotally attached to said end-effector and said support base with a spherical joint and a universal joint.

15. The robotic mechanism according to claim 12 wherein said first end of each rigid link arm is pivotally attached to said support base using a revolute joint.

16. The robotic mechanism according to claim 11 including a computer controller connected to each positioning mechanism for synchronizing the movement of each positioning mechanism with respect to the other positioning mechanisms to control movement of said end-effector.

17. The robotic mechanism according to claim 11 wherein said biasing member is a spring.

18. The robotic mechanism according to claim 11 wherein said biasing member is one of a hydraulically, pneumatically, and electrically powered cylinder having an adjustable length.

19. A five-degree-of-freedom robotic mechanism, comprising:

a support base, an end-effector and a biasing member having opposed ends and pivotally attached at one of said opposed ends to the support base with a universal joint and pivotally attached at the other of said opposed ends to the end-effector with a universal joint; and

five cables each connected at a first end thereof to said end effector and said five cables having second ends being attached to an associated positioning mechanism for moving the second ends of the associated cable independently of the other cables, said biasing member applying force on the end effector with respect to the support base for maintaining tension in said five cables, wherein movement of the second ends of the cables by the associated positioning mechanisms changes a position and orientation of the end-effector.

20. The robotic mechanism according to claim 19 wherein said positioning mechanism includes five rigid link arms each having first and second ends with the first end of each rigid link arm being pivotally attached to said support base and the second end attached to the second end of an associated cable, said positioning mechanism including an actuator engaged to said each rigid link arm for pivotally moving said rigid link arm for moving said cables to position the end-effector in a work-space.

21. The robotic mechanism according to claim 20 wherein said first end of each rigid link arm is pivotally attached to said support base using a revolute joint.

22. The robotic mechanism according to claim 19 including a computer controller connected to each positioning mechanism for synchronizing the

movement of each positioning mechanism with respect to the other positioning mechanisms to control movement of said end-effector.

23. The robotic mechanism according to claim 19 wherein said biasing member is a spring.

24. The robotic mechanism according to claim 19 wherein said biasing member is one of a hydraulically, pneumatically, and electrically powered cylinder having an adjustable length.

25. The robotic mechanism according to claim 1 wherein said at least three cables is three cables, and wherein said biasing member is pivotally attached to said end-effector with a first revolute joint and is pivotally connected to said support base with a second revolute joint, the first and second revolute joints having axis of rotation with are parallel, and wherein said positioning mechanism includes three winches each associated with one of the cables for independently retracting or deploying its associated cable, each winch being attached to said support base, each winch including a pulley with said second end of its associated cable being wrapped around the pulley, each winch including a motor connected to said pulley for rotating said pulley for retracting and deploying the cable attached thereto.

26. The robotic mechanism according to claim 25 wherein two of said winches are located adjacent to each other on one side of the biasing member and the other winch is located on the other side of the biasing member, and wherein the cable attached to a first of the two adjacent winches is attached to the end effector at a position on the other side of the biasing member, and wherein the cable attached to a second of the two winches is attached to the end effector at a position on the same side of the biasing members as the second winch, and wherein the cable attached to the winch located on the other side of the biasing member is attached to the end effector at a position adjacent to the first revolute

joint and aligned with the axis of rotation of the first revolute joint so that the robotic mechanism has three degrees of freedom.

27. The robotic mechanism according to claim 26 wherein said three cables are each attached to the end-effector using three revolute joints, and wherein each revolute joint has an axis of rotation, the three revolute joints being attached to the end-effector so the axis of rotation of each of the three revolute joints are parallel, and wherein the axis of rotation of the revolute joint attached to the end effector at the position adjacent to the first revolute joint has its axis of rotation collinear with the axis of rotation of the first revolute joint.

28. The robotic mechanism according to claim 25 wherein said biasing member is a spring.

29. The robotic mechanism according to claim 25 wherein said biasing member is one of a hydraulically, pneumatically, and electrically powered cylinder having an adjustable length.

30. The robotic mechanism according to claim 25 including a computer controller connected to each position mechanism for controlling movement of said end-effector.

31. The robotic mechanism according to claim 25 wherein two of said winches are located adjacent to each other on one side of the biasing member and the other winch is located on the other side of the biasing member, and wherein the cable attached to a first of the two adjacent winches is attached to the end effector at a position on the other side of the biasing member, and wherein the cable attached to a second of the two winches is attached to the end effector at a position on the same side of the biasing members as the second winch, and wherein the cable attached to the winch located on the other side of the biasing member is attached to the end effector at a position adjacent to the first revolute

joint and aligned with the axis of rotation of the first revolute joint, and wherein the two adjacent winches is a single common winch including a common shaft upon which the two pulleys are mounted, and including a common motor connected to said common shaft, and wherein the two cables connected to the two pulleys have a same length, and wherein the two cables connected to the two pulleys are parallel to each other so that the orientation of the end-effector is constrained to remain fixed during movement of the end-effector so that the robotic mechanism has two degrees of freedom.

32. The robotic mechanism according to claim 31 wherein said three cables are each attached to the end-effector using three revolute joints, and wherein each revolute joint has an axis of rotation, the three revolute joints being attached to the end-effector so the axis of rotation of each of the three revolute joints are parallel, and wherein the axis of rotation of the revolute joint attached to the end effector at the position adjacent to the first revolute joint has its axis of rotation collinear with the axis of rotation of the first revolute joint.

33. The robotic mechanism according to claim 31 wherein said biasing member is a spring.

34. The robotic mechanism according to claim 31 wherein said biasing member is one of a hydraulically, pneumatically, and electrically powered cylinder having an adjustable length.

35. The robotic mechanism according to claim 31 including a computer controller connected to each position mechanism for controlling movement of said end-effector.

36. The robotic mechanism according to claim 1 wherein said at least three cables is three cables, and wherein said biasing member is pivotally attached to said end-effector with a first revolute joint and is pivotally connected to said

support base with a second revolute joint, the first and second revolute joints having axis of rotation with are parallel, and wherein said positioning mechanism includes three rigid link arms each having first and second ends with the first end of each support arm being pivotally attached to said support base in such a way that the rigid link arms pivot in planes parallel to each other, and wherein the first ends of each cable is attached to the end-effector and the second ends of each cable is attached to the second ends of an associated rigid link arm, and wherein said positioning mechanism includes an actuator attached to each rigid link arm for pivotally moving each rigid link arm for moving said cables thereby moving the end effector.

37. The robotic mechanism according to claim 36 wherein two of said rigid link arms are located adjacent to each other on one side of the biasing member and the other winch is located on the other side of the biasing member, and wherein the cable attached to a first of the two adjacent rigid link members is attached to the end effector at a position on the other side of the biasing member, and wherein the cable attached to a second of the two adjacent rigid link members is attached to the end effector at a position on the same side of the biasing members as the second rigid link member, and wherein the cable attached to the rigid link member located on the other side of the biasing member is attached to the end effector at a position adjacent to the first revolute joint and aligned with the axis of rotation of the first revolute joint.

38. The robotic mechanism according to claim 37 wherein said three cables are each attached to the end-effector using three revolute joints, and wherein each revolute joint has an axis of rotation, the three revolute joints being attached to the end-effector so the axis of rotation of each of the three revolute joints are parallel, and wherein the axis of rotation of the revolute joint attached to the end effector at the position adjacent to the first revolute joint has its axis of rotation collinear with the axis of rotation of the first revolute joint.

39. The robotic mechanism according to claim 36 wherein said first end of each rigid link arm is pivotally attached to said support base using a revolute joint.

40. The robotic mechanism according to claim 37 wherein the actuator associated with each rigid link arm is connected to the revolute joint connected the rigid link arm to the support base, and including a computer controller connected to each actuator for controlling movement of said end-effector.

41. The robotic mechanism according to claim 36 wherein each of the rigid link arms is moved independently of the other rigid link arms so that the robotic mechanism has three degrees of freedom.

42. The robotic mechanism according to claim 1 wherein said end-effector includes a mounting mechanism for receiving a tool to be mounted on the end-effector.

43. The robotic mechanism according to claim 36 including a synchronizing mechanism connected to the two rigid link arms on the same side of the bias member so that the two rigid link arms remain parallel to each other during movement so that the robotic mechanism has two degrees of freedom.

44. The robotic mechanism according to claim 1 wherein said at least three cables is three cables, and wherein said biasing member is pivotally attached to said end-effector with a first revolute joint and is pivotally connected to said support base with a second revolute joint, the first and second revolute joints having axis of rotation with are parallel, and wherein said positioning mechanism includes first and second rigid link arms each having first and second ends with the first end of the first and second rigid link arms being pivotally attached to said support base in such a way that the rigid link arms pivot in planes parallel to each other, including a winch having beam pivotally attached to the second rigid link arm at a pivot connection point, and wherein the first ends of each cable is

attached to the end-effector and one cable is attached to the second end of the first rigid link arm and other two cables are attached to the beam with one cable attached on one side of the pivot connection point and the other cable being attached to the beam on the other side of the pivot connection, the winch including a drum attached to the support base, and wherein the second ends of the other two cables are attached to said drum, the winch including a drum biasing member for maintaining tension on the two cables attached to the drum, and wherein said positioning mechanism includes an actuator attached to each rigid link arm for pivoting each rigid link arm for moving the end effector, and wherein the two cables have the same length so that during movement of the end effector the orientation of the end effector remains fixed so that the robotic mechanism has three degrees of freedom.

45. The robotic mechanism according to claim 44 wherein the winch includes a cam mounted on the support base with the cam being engagable to one of the two cables in order to create a bias in the length of said one of the two cables so that during movement of the end effector the orientation of the beam, and therefore the end effector can be varied thereby adding a new degree of freedom to the robot mechanism, and wherein the cam includes a cam actuator for moving the cam for adjusting the amount of bias in said one of the two cables.

46. The robotic mechanism according to claim 44 wherein said biasing member is a spring.

47. The robotic mechanism according to claim 44 wherein said biasing member is one of a hydraulically, pneumatically, and electrically powered cylinder having an adjustable length.

48. A robotic mechanism, comprising:

an end effector, a post having opposed ends being pivotally connected at one of said opposed ends to the end effector;

a support base defining a plane and having a hole extending therethrough, an outer ring structure pivotally connected to said support base within said hole for pivotal motion of said outer ring structure out of the plane of said support base, a first actuator for pivoting said outer ring structure, an inner ring structure pivotally mounted to said outer ring structure inside said outer ring structure, said inner ring structure being concentric with said outer ring structure, a second actuator for pivoting said inner ring structure, said inner ring structure having an axis of rotation in the plane of the outer ring, and perpendicular to the axis of rotation of said outer ring structure, said inner ring structure having a central web with a hole therethrough and a universal joint mounted in said hole to the central web, the other end of said post being slidably mounted in said universal joint, bias means connected to said post for biasing said end effector away from said support base;

a first set of three cables each connected at one end thereof to said end effector and the other ends of said first set of three cables being attached to positioning means mounted on said support base for pulling said three cables independently of each other to position said end effector in a selected position in space; and

a second set of three cables each connected at one end thereof to said end effector and the other ends thereof being attached to the other end of said post, said second set of three cables being mounted to said inner ring at substantially 120° with respect to each other and constrained to be parallel to each other between said end effector and said inner ring and wherein when said positioning means moves said end effector to a selected position in its workspace, said second set of three cables maintains said end effector in a plane parallel to the plane of said inner ring.

49. The robotic mechanism according to claim 48 including a first set of three pulleys each pivotally mounted on said inner ring structure at substantially 120° with respect to each other, and including a second set of three pulleys each pivotally mounted on said central web at substantially 120° with respect to each other and in registration with said first set of pulleys, wherein each pulley of said first set of three pulleys guides one cable each of said second set of three cables to an associated pulley from said second set of three pulleys.

50. The robotic mechanism according to claim 49 including biasing means associated with each cable of said second set of three cables for maintaining tension on each cable of said second set of cables.

51. A robotic mechanism, comprising:

an end effector, a post having opposed ends being pivotally connected at one of said opposed ends to the end effector using a universal joint, the post having an adjustable length;

a support base defining a plane and having a hole extending therethrough, an outer ring structure pivotally connected to said support base within said hole for pivotal motion of said outer ring structure out of the plane of said support base, a first actuator for pivoting said outer ring structure, an inner ring structure pivotally mounted to said outer ring structure inside said outer ring structure, said inner ring structure being concentric with said outer ring structure, a second actuator for pivoting said inner ring structure, said inner ring structure having an axis of rotation in the plane of the outer ring, and perpendicular to the axis of rotation of said outer ring structure, said inner ring structure having a central web with a hole therethrough and a universal joint mounted in said hole to the central web, the other end of said post being slidably mounted in said universal joint,;

a first set of three cables each connected at one end thereof to said end effector and the other ends of said first set of three cables being attached to a positioning mechanism mounted on said support base for pulling said three

cables independently of each other to position said end effector in a selected position in space; and

a second set of three cables each connected at one end thereof to said end effector and the other ends thereof being attached to, a winch mounted on said central web of the inner ring assembly, said second set of three cables being guided through pulleys mounted to said inner ring at substantially 120° with respect to each other and constrained to be parallel to each other between said end effector and said inner ring, wherein the winch retracts or deploys all three cables simultaneously and keeps the cable lengths between the inner ring and the end-effector equal so that when said positioning mechanism moves said end effector to a selected position in its workspace, said second set of three cables maintains said end effector in a plane parallel to the plane of said inner ring.

52. A robotic mechanism, comprising:

an end effector, a post having opposed ends and an adjustable length being pivotally connected at one of said opposed ends to the end effector;

a support base, the other end of said opposed ends of the post being pivotally connected on a top surface of said support base;

a set of three cables each connected at one end thereof to the end of said post pivotally connected to said end effector and the other ends of each of said first set of three cables being attached to positioning means mounted on said support base for pulling said cables to position said end effector in a selected position in space;

a first longitudinal shaft having a first longitudinal axis and a pulley being rigidly mounted on each end of said first shaft, said first longitudinal shaft being mounted on a bottom surface of said support base and parallel to said support base, the first longitudinal shaft is passing through a first sleeve, a first rotational spring mounted from one end to the first sleeve and from the other end to the first longitudinal shaft for applying a constant torque to the fist longitudinal shaft, including a first motor connected to said first longitudinal shaft for rotating said first longitudinal shaft about an axis parallel to the said support base and normal

to said first longitudinal shaft , a second longitudinal shaft having a second longitudinal axis and a pulley rigidly mounted on each end of said second shaft, said second longitudinal shaft being mounted on the bottom surface of said support base and parallel thereto and oriented so said first longitudinal axis is perpendicular to said second longitudinal axis, the second longitudinal shaft is passing through a second sleeve, a second rotational spring mounted from one end to the sleeve and from the other end to the second longitudinal shaft applies a constant torque to the second longitudinal shaft, including a second motor connected to said second longitudinal shaft for rotating said second longitudinal shaft about an axis parallel to the said support base and normal to said second longitudinal shaft; and

a first pair of cables with each cable connected at one end thereof to said end effector and the other end of one of the cables being collected by one of the pulleys at the end of the first longitudinal shaft and the other end of the other cable being collected by the other pulley at the other end of the first longitudinal shaft, the first rotational spring mounted in the first sleeve 148 which applies torque to the first longitudinal shaft has both the pulleys rotate and collect the first pair of cables so that the lengths of the cables of the said first pair of cables remain the same and therefore a parallelogram is maintained by the first pair of cables, a second pair of cables with each cable connected at one end thereof to said end effector and the other end of one of the cables being collected by one of the pulleys at the end of the second longitudinal shaft and the other end of the other cable being collected or deployed by the other pulley at the other end of the second longitudinal shaft as said second longitudinal shaft is rotated by the torque provided by the rotational spring mounted in the second sleeve 146 and therefore the length of the cables of said second pair of cables remains the same and thus a parallelogram is maintained by the second pair of cables, and wherein said cables of said first pair of cables are parallel and said cables of the second pair of cables are parallel so that a plane defined by said end effector is maintained parallel to a plane defined by said two longitudinal shafts.

53. The robotic mechanism according to claims 43 wherein said end-effector includes a mounting mechanism for receiving a tool to be mounted on the end-effector.